

Amendments to the Claims: This listing of claims will replace all prior versions, and listings, of claims in the application

Listing of Claims:

1. (Withdrawn) A method of preparing a cast composite material, comprising the steps of: providing an aluminum-based matrix alloy; preparing a molten mixture of from about 10 to about 40 volume percent of free-flowing boron carbide particles and from about 90% to about 60 volume percent of a melt of said aluminum-based matrix alloy; stirring the molten mixture to wet the matrix alloy to the boron carbide particles and to distribute the particles throughout the volume of the melt; and casting the molten mixture to form a cast composite material;

characterized by maintaining the fluidity of the molten mixture by limiting the Mg in the aluminum-based matrix alloy to below 0.2% by weight, at least until completion of said distribution of said particles throughout said volume of the melt.

2. (Withdrawn) A method according to claim 1, characterized in that the mixture is prepared with an amount of said boron carbide within the range 10 to 25 volume percent.

3. (Withdrawn) A method according to claim 1, characterized in that the mixture is prepared with an amount of said boron carbide within the range 15 to 20 volume percent.

4. (Withdrawn) A method according to claim 1, characterized by limiting said magnesium content to less than 0.1% by weight.

5. (Withdrawn) A method according to claim 1, characterized by limiting said magnesium content to less than 0.05% by weight.

6. (Withdrawn) A method according to claim 1, characterized in that the melt is prepared with a matrix alloy that is either an AA1000 type alloy or an aluminum alloy comprising 5 to 10% by weight Si.

7. (Withdrawn) A method according to claim 1, characterized in that further magnesium is added to the molten mixture a short time before casting.

8. (Withdrawn) A method according to Claim 7, characterized in that the amount of said further magnesium added to the molten mixture raises the magnesium concentration in the aluminum matrix alloy to between 0.2% and 0.8% by weight.
9. (Withdrawn) A method according to Claim 7, characterized in that the further magnesium is added in a casting trough or in a transfer ladle.
10. (Withdrawn) A method according to claim 7, characterized in that the mixture is further stirred after the addition of the magnesium.
11. (Withdrawn) A method according to claim 7, characterized in that the aluminum alloy employed to prepare the mixture is selected from the group consisting of AA2xxx, AA3xxx, AA4xxx, AA6xxx, AA2xx or AA3xx alloys.
12. (Withdrawn) A method according to claim 7, wherein molten mixture is cast within 20 minutes of adding the further magnesium.
13. (Withdrawn) A method according to claim 1, characterized in that the molten mixture contains Ti in an amount of at least 0.2% by weight but no more than 5% by weight.
14. (Withdrawn) A method according to Claim 1, characterized in that further magnesium is added to the molten mixture to raise the magnesium concentration in the aluminum matrix alloy to between 0.2% and 1.4% by weight.
15. (Withdrawn) A method according claim 13, characterized in that the aluminum alloy is selected from the group consisting of AA2xxx, AA3xxx, AA4xxx, AA6xxx, AA2xx or AA3xx alloys with added titanium.
16. (Withdrawn) A method according to claim 13, characterized in that the aluminum matrix alloy is an AA1xxx alloy with added titanium.
17. (Withdrawn) A method according to Claim 14, characterized in that the molten mixture is cast within 30 minutes of adding the further magnesium.

18. (Currently Amended) A method of preparing a cast composite material, comprising the steps of: providing an aluminum-based matrix alloy; preparing a molten mixture of from about 10 to about 40 volume percent of free-flowing boron carbide particles and from about 90% to about 60 volume percent of a melt of said aluminum-based matrix alloy; stirring the molten mixture to wet the matrix alloy to the boron carbide particles and to distribute the particles throughout the volume of the melt; and casting the molten mixture to form a cast composite material;

characterized by maintaining the fluidity of the molten mixture by providing at least 0.2% 0.5% by weight but no more than 5% by weight of Ti in the aluminum-based matrix alloy and by limiting any Mg in the aluminum-based matrix alloy to below 0.2% by weight, at least until completion of said distribution of said particles throughout said volume of said melt.

19. (Currently Amended) A method according claim ~~[[1]]~~ 18, characterized in that the cast mixture is remelted and cast into a shape.

20. (Currently Amended) A method according to claim ~~[[1]]~~ 18, characterized that the cast mixture is extruded into a shape.

21. (Currently Amended) A method according to claim ~~[[1]]~~ 18, characterized that the cast mixture is rolled.

22. (Currently Amended) A method according to claim ~~[[1]]~~ 18, characterized that the cast mixture is forged.

23. (Currently Amended) A method according to claim ~~[[1]]~~ 18, characterized that the cast mixture is formed into a neutron absorbing material.

24. (Withdrawn) A cast composite product comprising an aluminum alloy matrix having between 10 and 40 volume percent of boron carbide refractory particles dispersed therein, said composite containing at least 0.2 weight percent but no more than 5 weight percent titanium, said titanium forming a stable titanium-containing compound on the surface of the boron carbide particles that is not dispersed in the matrix and prevents attack by the aluminum alloy in the matrix, and the aluminum alloy matrix having an as-cast microstructure.

25. (Withdrawn) A cast composite product according to Claim 24, wherein the aluminum alloy matrix is an AA1xxx alloy.
26. (Withdrawn) A cast composite product according to Claim 24, wherein the aluminum alloy matrix contains at least 0.2 weight percent magnesium.
27. (Withdrawn) A cast composite product according to Claim 24, wherein the aluminum alloy matrix is an AA2xxx, AA3xxx, AA4xxx, AA6xxx, AA2xx or AA3xx alloy.
28. (Withdrawn) A cast composite product comprising an aluminum alloy matrix having between 10 and 25 volume percent of boron carbide refractory particles dispersed therein, said composite containing at least 0.2 weight percent magnesium, said composite exhibiting substantially no aluminum carbide crystals at the surfaces of the refractory particles when examined metallographically, and the aluminum alloy matrix having an as cast microstructure.
29. (Withdrawn) A cast composite according to Claim 28, wherein the aluminum alloy is an AA2xxx, AA3xxx, AA4xxx, AA6xxx, AA2xx or AA3xx alloy.
30. (Withdrawn) A cast composite according to Claim 28, wherein the composite contains no more than 0.8 weight percent magnesium.
31. (Withdrawn) A cast composite product comprising an aluminum alloy matrix having between 10 and 40 volume percent of boron carbide refractory particles dispersed therein, wherein the aluminum alloy matrix contains at least 0.2 weight percent magnesium, the composite contains at least 0.2 weight percent titanium but no more than 5 weight percent, said titanium forming a stable titanium-containing compound on the surface of the boron carbide particles that is not dispersed in the matrix and prevents attack by the aluminum alloy in the matrix, and the aluminum alloy matrix has an as cast microstructure.
32. (Withdrawn) A cast composite according to Claim 31, wherein the aluminum alloy is an AA2xxx, AA3xxx, AA4xxx, AA6xxx, AA2xx or AA3xx alloy.

33. (Withdrawn) A cast composite according to Claim 31, wherein the aluminum alloy matrix contains no more than 1.4 weight percent magnesium.
34. (New) A method according to Claim 18, characterized in that the aluminum-based matrix alloy contains not more than 4.2 weight % Si.